

**Adab means:
enriching one's knowledge
with other's**

Djahiz

Mind the master: reflections on what students taught me

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George Steiner¹ argues that the master-disciple relationship is far more complex than commonly appreciated in contemporary pedagogies. On the basis of recent work by students at Maastricht University I argue that amateurs or students can play an essential role in academic knowledge networks. Whereas traditional views stress the need to translate teacher knowledge into student learning, the reverse could be argued as well: student learning translates into teacher knowledge. The presentation stresses the need to have an inclusive view of knowledge networks, incorporating amateurs and students and pleads for an amateurisation of science.

As a social scientist I study amateurs and their contribution to the world of knowledge. As a European I enjoy wisdom from beyond: from the Dominican cassava cultivator, the Burkinabé historian or the Indian economist who traces his religious roots to Saint Thomas. As a teacher I learn from students. This cannot make for serious science, one might object.

'This does not make for serious science, as it is currently perceived', I could respond. I see current science developing in a direction of ever more closed epistemic communities², impervious to the amateur, the marginal observer in marginal lands, or the student. In the following observations I report to you some of the things learned from students.

I am seriously concerned about the declining opportunities for learning in our university. Will it continue to attract the brightest students that force the staff to

¹ George Steiner *Lessons of the Masters* London (Harvard University Press) 2003. Steiner argues in his introduction that masters learn from students through a process of interaction or osmosis while educating them, thereby generating friendship of the highest kind. For a harsh critique see Edward Skidelski in the *New Statesman* (2004) [underlined items are hyperlinked, available on 14-5-2005]. For a review of teacher-learning from student-interaction see Bissaker and Heath 2004.

² Epistemic communities are in Haas' words 'knowledge-based communities that have a common approach to understanding, and that give common policy advice' see Harold K. Jacobson 'International institutions and system transformation' *Annu.Rev.Polit.Sci* 2000 (3): 160

learn? Will it continue to maintain staff members who learn from students like they do from their colleagues? Cutbacks in education-budgets may convince the sharpest minds to not come and learn in our university. Personnel policies may force our younger staff to pay more attention to citation ratings than to student learning. The commodification of knowledge through private (and public) publishing houses may increasingly thwart the development of our sharpest minds, especially those in the underprivileged circumstances of poor countries.

It is those minds that I have enjoyed during my years in the university, and from whom I learned much of what I am about to say. I could have taken any other selection, but will just concentrate on one theme among the many I was involved in: the quintessential role of laypersons or amateurs in professional scientific knowledge networks.

Let me first give you the conclusion that I draw from these students' work. I shall reflect on this conclusion at the end and show its implications for some of the questions just asked regarding the Building of the Scientific Mind.

1. *Recognize that amateurs matter in science as elsewhere*
2. *Amateurs matter but so does social context*
3. *Professional scientists prefer to go it alone*
4. *Use brokers to link amateurs and professionals*
5. *Link private strategy to public policy through open clusters*
6. *Gear Government policies to knowledge exchange between amateurs and professionals.*
7. *Use international cooperation agencies as brokers in science and technology.*
8. *Acknowledge a novel mode of knowledge production based on the professionalisation of amateurs and ...*
9. *Prepare for the amateurisation of science.*

Allow me to take you in nine easy steps to this outrageous conclusion.

Step 1 Recognize that amateurs matter

Koen van Deudekom is interested in studying amateur contributions to wine technologies in Dutch Limburg. This is a tricky topic: economists have by-passed the contribution of non-professionals in technology development, just as historians have done with non-pro's working on genealogy or local history. But his supervisors became excited about previous work that another student had done on the same topic and convinced Koen to do his thesis on it.³

³ Louk Box and Maartje van der Zwet *New wine on old grounds: Knowledge network and cluster development among vintners in the trans-border Limburg region*, Maastricht (Working Paper presented at UNU-Intech Workshop on Wine Technologies) 2003

Koen did a discovery: he found an exciting article and all appeared to fall into place.⁴ It argued that a new breed of amateurs is transforming society, dubbed by Leadbeater & Miller (2004: 20) the professional amateur or Pro-Am. Pro-Ams are a 'new social hybrid' or 'amateurs who work to professional standards.' (Id. 12). They are 'knowledgeable, educated, committed and networked by new technology.' (Ibid.). Whereas the 'twentieth century was shaped by large hierarchical organisations with professionals at the top', 'Pro-Ams are creating new, distributed organisational models that will be innovative, adaptive and low cost.' (Ibid.) A key word in their formulation is "educated", for an ever larger part of the general public receives advanced education. They have been, and still are, students and can easily turn into the so-called Pro-Ams.

If Leadbeater and Miller are right, Koen argued, we must be on track with our study of amateur wine cultivators in Limburg. Maybe it is not as outlandish a topic as some of our colleagues considered it in 2003. It must be possible to track the influence amateurs have on traditional wine technology and show how they shape technology development. This is a radical departure of current economic wisdom, for it does not follow traditional models of knowledge production, stressing intellectual property rights, patents and professional prestige or publication records. Amateurs generally do not apply for patents, and generally don't publish in professional journals. Yet they do appear to have a large influence, according to Leadbeater and Miller in their analysis of a field like astronomy. Amateurs value something for its own sake, not because of the immediate utility or profit.⁵ They are, in classical sociological terminology, rather value-oriented than goal-oriented. I shall use the term amateurs rather broadly, including local farmers, fishermen and other folk who share a value orientation to knowledge production in a particular field of endeavour. Amateurs matter – and so do the students who taught me.

Step 2 Amateurs matter, but so does context

Maartje van der Zwet searched a thesis topic, two years ago. I proposed she look into the development of wine cultivation in Limburg and analyse the role of amateurs in regional knowledge networks. It took her a little more time and wine than expected, but after a few months she said: 'No, we are on the wrong track. We need a comparative analysis between the two Limburgs: the Dutch and the Belgian part. Only then will we understand what is going on.' I had proposed the method I applied in banana, cassava and cocoa cultivation in Latin America; but Maartje argued in favour of a comparative approach. Right she was. It appeared that in both Limburgs amateurs did have influence on wine technology

⁴ Charles Leadbeater & Paul Miller, *The Pro-Am Revolution: How enthusiasts are changing our economy and society* Demos (November 2004) [

⁵ Frank Veraart (also in a Pers. Comm. 2004) shows in his study on the development of the PC computer "how amateurs first worked together with professionals but that tensions between cultures arose when computing was getting more commercial. It also shows that the distance between producers and users grew and this also changed the actions of the intermediary actors in relation to users."

development, yet the effect was very different in the Belgian Haspengouw than in Dutch Mergelland.

The Dutch case became characterised by ‘*separate we go*’: professional amateurs going one way, commercial professionals going it alone another way. The largest commercial grower in Maastricht hardly entertains contacts with amateurs; he rather entertains buyers or visitors. An integrated cluster has not developed, and neither has a governmental policy to sponsor such development. How different is the Belgian case, characterised by ‘*together we win*’: one or two commercial professionals linking up with a network of professional amateurs. The commercial professional realises the value of an ‘Appellation Contrôlée’, which needs a number of quality producers in a specific region. This stimulated cooperation among the Belgian producers, who exchange information and knowledge to a far greater extent than their Dutch colleagues. Conclusion: amateurs matter, but so does the context in which they (net)work.

Step 3 Remember: professionals prefer to go it alone

Lotte Asberg found out the hard way. She wanted to know if and how professional biotechnologists in India cooperate with peasant farmers in setting their research priorities. If research is socially shaped, as her supervisor Wiebe Bijker argues, then surely it would be interesting to see to what extent farmer-priorities shape biotechnological research in a country like India. India is home to about one-fifth of the world’s population, to about one quarter of the world’s farmers and to a significant part of the world’s agricultural researchers. Lotte went to India and followed researchers like a good social scientist should: critically yet understandingly. She was allowed to study a biotech project co-funded by Dutch aid, which was specifically aimed at linking local farmer-knowledge with professional researcher interests.

Lotte was in for a deception: she concludes⁶ that professional scientists prevent farmers from influencing research priorities, even if they pretend that farmers can do so in a project which espouses a Bottom-Up approach. The social and cultural factors that shape farmer-researcher interaction in fact hinder, instead of help knowledge from being exchanged. Lotte thereby hints at a complication that Maartje showed to operate in the Limburg case: context matters in knowledge exchange between amateurs and professionals, especially the Indian cultural context with its hierarchical relations (Asveld 2001: 90). How does one bridge this divide?

Step 4 Use brokers to link amateurs and professionals

An Indonesian student showed how Lotte’s lessons can be applied: by providing knowledge brokerage. One may not assume that poor farmers or fishermen can articulate their needs for researchers; just as one may not assume that

⁶ Lotte Asveld, *Biotechnology and development aid: How democratic can technology be?* Maastricht (MA Thesis, Maastricht University) 2001

researchers can link into local knowledge networks. It takes skilled brokers to make that link.

The work reviewed until now was evenly divided between the public sector (in India) and the private sector (in both Limburgs). Lisette Groot⁷ has taken the analysis one step further: she compares the interaction between professionals and local 'amateurs' in two knowledge networks linking her native Indonesia with The Netherlands. She made a study of knowledge transfer for sustainable energy development in wind and solar energy technologies. On the one hand, windmill-technology: a classical matter of Dutch pride, developed in an academic or public context – on the other hand photo-voltaic cell technology as developed by the Shell Company in a private commercial context. Lisette argues that a simple but effective feedback or brokerage mechanism can explain the success of one: village experimentation. The failure of the other can be traced to the lack of effective brokerage between user experience and designer preference. What failed?

Indeed, the academically designed windmill: it was so perfect it did not need user feed-back. In Lisette's cogent conclusion: "The failure of wind-energy technology in Indonesia is not because [of] the technology itself. It is because the "sender" (the Netherlands) did not listen and see the conditions in Indonesia [...] (Groot 2003: 62). This situation sharply contrasts with the 'mixed approach' she proposes between top-down and bottom-up approaches, in which "the 'sender' decided what was appropriate for the rural areas, but did talk to the end-user and adjust the technology to local circumstances." (Id: 63)

In other words: knowledge production in the public university proved to be less open to brokerage than in the private company. Shell allowed for a mixed approach in which the professional scientists or technologists listened to end users, and so opened their knowledge network to 'amateurs'.

Step 5 Link private strategy to public policy through open clusters

How do firms collaborate among each other to promote technological innovation? In the case of wine technologies, the Dutch commercial professionals hardly seemed to collaborate among each other or with the professional amateurs. The Belgians, however, showed strong clustering of firms around one or two of the major producers, thus strengthening technological innovation.

I want to elaborate on this observation on the basis of a case study which investigated industrial technology development.

Armando Bajares'⁸ did studied the cooperative development of *Aloe Barbadensis* processing in his native Venezuela. I shall take this as an example of an open cluster, in the sense that it is highly responsive to external knowledge,

⁷ Lisette P. Groot, *"The Windmills of Your Mind": A study of Dutch-Indonesian technology transfer for sustainable energy development* (ESST MA Thesis, Maastricht University) 2003

⁸ Armando Bajares *¿Sistemas o redes de conocimiento? Un estudio sobre las Redes de Cooperación de Zábila del Ministerio de Ciencia y Tecnología de Venezuela* Maastricht/Aalborg (ESST MA, Maastricht University/ Aalborg University) 2003

is articulated with public agencies like universities and generates elementary but significant locally developed technology. Armando could locate at least five technological innovations, which were developed in the Sucre municipality in Venezuela (Falcon). A strong local producer's association had developed on the basis of informal communal ties (Bajares 2003: 60), closely linked with an experiment station⁹, a University and the Ministry of Science and Technology. One marvels at the speed with which these technological innovations were developed and an export market explored. Armando concludes that the dynamism of this cluster is especially due to the personal interest which professional technologists took (Ibid). This led to informal relations in different parts of Falcon State 'based in interaction and reciprocity, linking them in personal relations based in [common] cultural values.' These, in turn led to mutual trust and respect (Ibid). Armando's *Aloe* cluster is like the Belgian wine growers: their cluster is open, new ideas are easily shared based on informal relations between professional technologists and local producers. Whereas in Dutch Limburg the state is virtually absent, it is highly involved through informal brokers in Venezuela and in Belgian Limburg. This paradoxical result needs an elaboration, for the state is not always the informal stimulus as Tao Ren has shown in the Chinese case.

Step 6 Gear Government policies to knowledge exchange between amateurs and professionals

Lisette worked in a mixed Indonesian-Dutch context, trying to bridge the culture gap between professional researchers and interested villagers. But what happens when the researcher becomes part of the gap? Tao Ren¹⁰ studied the politics of cotton innovation in Xinjiang (China), one of the world's main production areas. Tao studied the chances of sustainable or 'organic' cotton cultivation in his native Xinjiang. He had found that a European market exists for such organic cotton (at a premium of 20-30%), and was interested to see how Xinjiang producers responded.

The brief answer is: they cannot. They have to adopt Genetically Modified (GM) varieties¹¹, which may be questionable as far as sustainability is concerned. The Beijing Central Government is more concerned about regional stability in this Muslim province, than in environmental sustainability; biotechnological solutions are favoured and local demands suppressed. If there is brokerage – it is to implement the Central Government's concerns top-down. Local knowledge is not appreciated, but discouraged through active brain drain (Ren 2002: III-11) resulting in knowledge loss. International cooperation through German GTZ

⁹ M.Peña (et al.) *Proceso para la clarificación del gel de Aloe vera utilizando minerales de la región.* (Process for the clarification of the gel of *Aloe vera*'s gel using minerals of the region), UNEFM 2004 (item 349, 351, 354)

¹⁰ Tao Ren, *Is technology the problem? Politics and cotton innovation in Far-West China* Maastricht (ESST MA Thesis, Maastricht University) 2002

¹¹ For a recent report on the introduction of transgenic cotton varieties see People's Daily On-Line 22-9-2004

hardly had any effect in articulating local knowledge for organic cotton production, even though ample market opportunities existed. In a fascinating epilogue, Tao reflects on his research experience in China. Whereas Lisette experienced openness and interest, Tao suffered exclusion and resistance. (Id. Annex 1:iii) A culture of connections exists in this society, hardly open to Xinjiang local knowledge or for that matter to the local student of science and technology. He could hardly link up with the cotton biotech knowledge network and found that the “most open and most critical of all were retirees.” The Chinese technology development system may therefore be characterised by closure, hierarchy, and lack of trust. Brokerage with amateurs or with local knowledge can hardly occur and a closed technological community may well be the stifling consequence. Even though international cooperation did occur in the case of organic cotton, it could not articulate local knowledge as Lisette Groot showed in her case study on wind-energy. In Hofstede’s¹² words: culture matters. This leads to the interesting question on the role of international cooperation agents (public or private) in brokering relations between local knowledge and professional knowledge.

Step 7 Use international cooperation agencies as brokers

International institutions play an increasingly important role in transforming the global political system, and scholars produce new ideas about how this is happening. Scholars produce new ideas, which can be applied through policy advice.

In his classical work on epistemic communities, Haas¹³ has analysed the improvement of environmental conditions in the Mediterranean Sea along these lines:

“Haas argued that in its efforts to improve the environmental condition of the Mediterranean Sea, the United Nations Environment Programme helped create and shape an epistemic community. This epistemic community then played a major role in shaping a plan and bringing governments of states to approve and implement the plan.”¹⁴

A comparable phenomenon occurs in development-oriented research, when international cooperation agencies intervene. I have given already the examples of the German GTZ co-sponsoring organic cotton-research in China, the Dutch DGIS funding windmill research for Indonesia, or Shell investing in sustainable energy projects. Armando Bajares work in Venezuela was indirectly affected by

¹² Geert Hofstede *Culture's Consequences, Comparing Values, Behaviors, Institutions, and Organizations Across Nations* Newbury Park, CA: Sage Publications; Second Edition; February 2003

¹³ Peter M. Haas “Do regimes matter?: Epistemic communities and Mediterranean pollution control”, in : *IO*, 43 (1989), pp. 377-403

¹⁴ Jacobson *Op.cit.* 160

trends in such research. As prevalent as the phenomenon may be, as little it has been researched.¹⁵

Hanne Johnsrud¹⁶ has done a preliminary synthesis of these ideas along the lines of Science and Technology Studies. In her thesis *Contextualised science and technology policies- the need for articulation of need* she contrasts

- * the traditional centralist, top-down-approach, where bureaucratic policy sets goals and priorities, based on academic interests and demands (Mode 1)

- * the traditional participatory, bottom-up approach, with civil society setting the agenda (Mode2).

She notes that a third position appears to be emerging and that “the distinction between these positions is blurring. Proponents of a centralist approach recognised the need for wider stakeholder interests to inform government policy, while proponents of the participatory approach recognised the importance of mechanisms for dialogue with government and academia. In that sense a Mode 3 has come about with its “need for contextualised, networked approaches to knowledge production, including disciplinary and local knowledge.”¹⁷

Step 8 Acknowledge a novel mode of knowledge production

If the Third Mode of knowledge production is indeed emerging, as I have tried to argue in my inaugural lecture in 2001 two related phenomena can be better understood which both occur at the interface between the traditional professionals and the traditional amateurs. Leadbeater and Miller noted the appearance of the Pro-Am, the professional amateur, or the new social hybrid – the amateur working according to professional standards. Less attention has been paid to the complementary phenomenon, the amateurisation of professions. I argue that it is just as significant, yet much less recognised for obvious reasons. Take the case of science. Some scientists are willing to accept the role of amateurs, as is presently the case in European phenological networks. Climate change is occurring at such speed, and with such extremes, that amateur observations are systematically collected to witness the effects. New networks are formed through civil society organisations or NGO’s, using non-conventional means like radio-programmes, interactive websites, or SMS exchanges.

Annette Zimmermann has shown how internet is affecting a developing country like Peru. On the basis of painstaking analysis of what happens in *telecentros* she argues, “internet helps to foster existing relationships and to establish new ones”. This is especially true for what she calls ‘leader’s on-line networks’ which integrate community institutions and increase social capital or trust. This in turn

¹⁵ Louk Box *To and Fro: international cooperation in research and research on international cooperation* Maastricht (Maastricht University Press) 2001

¹⁶ Hanne Johnsrud *Contextualised science and technology policies- the need for articulation of need* Oslo / Maastricht (ESST MA, University of Oslo/Maastricht University) 2004

¹⁷ Johnsrud 2004: 78-79

“triggers higher satisfaction with overall quality of life.”¹⁸ If Annette’s conclusions are corroborated in further research, this has great implications for the governance of science. The networks which she studied could contribute to global understanding of social phenomena, just as the global phenology networks help understanding the effects of climate change.

Step 9 Prepare for the amateurisation of science!

To make such networks work, an amateurisation of science is needed. The very terminology gives some of my colleagues the shivers. ‘This opens up the sacred halls of science to dilettantism; this is the renaissance of the charlatan, of quackery.’ No need to shiver – it has happened for ages. A number of now celebrated scientists like Mendel, were disregarded dilettantes at the time they made their discoveries; the same goes for the man who made the first geological map in the world¹⁹.

If one looks at the authors of the books, which deal with this phenomenon they all share one thing: they are science journalists. Most professional ‘science amateurs’ have this background: Simon Winchester in the UK, Karel Knip in The Netherlands. For a long time this profession has not received the recognition it merits. Yet it plays a crucial role at the interface, recognised by the honorary doctorate granted to Karel Knip by Amsterdam’s Free University.

Few scientists are able to take the step to ‘amateurisation’ or ‘popularisation’, generating the interface between the amateur and the professional. Yet they are on invaluable importance. They are highly respected in their field and stimulate intellectual debate beyond it. If I speak about ‘amateurisation of science’ it is to them that I refer, and to science journalists. These are not quacks, they fight quackery whenever they can. They form the linkages between an increasingly professional lay public and their scientific peers.

The question is: how can their effectiveness be increased? I would argue: by opening up the interface. Use the internet and publish on it. Have journals appear in the public space of the Web, like the Public Library of Science does. Have scientists in the ‘zones of silence’ participate in public global debate, like www.SciDev.net does, sharing scientific news from the journals *Science* and *Nature* and making it available all over the world. Do not follow the trail of private publishing empires in ridiculously expensive journals governed by closed epistemic communities enforcing questionable ISI standards as in economics²⁰.

¹⁸ Annette Zimmermann *Internet in the developing world: finding the social link between technology and development in Peru* Maastricht (ESST MA Thesis) 2004: 86

¹⁹ There is a rapidly increasing literature on the subject. See for popular literature Jenny Uglow *The Lunar Men: five friends whose curiosity changed the world 2002*; John Malone *It does not take a rocket scientist: great amateurs of science* New York (Wiley) 2002. See also Simon Winchester *The map that changed the world* (Harper Collins) 2002 For specialist literature see Julian Lowell Coolidge *The Mathematics of Great Amateurs* Oxford (Oxford University Press) 1990

²⁰ Geoffrey M. Hodgson & Harry Rothman *The Editors and Authors of Economics Journals: a Case of Institutional Oligopoly?* *The Economic Journal* Volume 109 Issue 453 Page 165 - February 1999

Plead with governments to stimulate public scientists, paid by public money, to publish in public channels like the internet.

I have given you my conclusion at the outset. Let me rephrase it in just a few statements.

* **Amateurs** matter in science as elsewhere, but they matter in different ways depending on the social context they function in. Students can be seen as amateur professionals.

* **Professional scientists** prefer to go it alone, but they increasingly face the need to articulate and broker local or non-professional knowledge to make scientific and technological development sustainable.

* Clusters of **amateur professionals** can make the difference in scientific development. This is also the hidden dimension in university knowledge production, where teachers unwittingly learn from students.

* Such exchange promotes open knowledge networks; it can also stimulate **global public debate** and strengthen international cooperation in science and technology.

* We need a **social movement** based on the professionalisation of amateurs or, more daringly, the amateurisation of professional scientists.

What does this mean for the Building of the Scientific Mind? Following George Steiner's dictum that masters learn from students while educating them, we need to acknowledge that scientific learning takes place in interaction. In open knowledge networks, this means in the university context allowing for 'reverse learning' or teacher-learning through student-interaction. In other contexts it means researcher-learning through amateur-interaction. Obviously such learning processes change the fundamental role patterns that we have become used to. Just like amateurs or laymen can be expected to professionalise (as Leadbeater & Miller argue), scientists can be expected to 'amateurise'²¹. This means, for example, daring to doubt the strictures of a discipline for the love of knowledge and good sense.

If this is like cursing in our academic church, let me finish with the most traditional of pleas: Amen - let it be!

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²¹ Amateurisation has been referred to in different contexts such as in [publishing](#); the earliest use of the term found in the Web was in 1996 in a critical article on re-amateurisation in evangelical mission by [Winter](#); see also for a [general article](#) in the New York Times.